REMARKS/ARGUMENTS

Claims 1-10 are pending. Claims 1 and 7 are amended.

In response to the Office Action, favorable reconsideration and allowance of the present application are respectfully requested. The Office Action rejects claims 7-10 as anticipated by Inazawa et al. Claims 1-10 were also rejected under 35 U.S.C. § 103(a) as obvious in view of Koh et al. In addition, claims 1-10 were rejected under 35 U.S.C. § 103(a) as obvious in view of Nallan et al. For the reasons set forth in detail below, it is respectfully submitted that this application is now in condition for allowance.

Submitted herewith is a translation of the priority document for the present application. Because the publication date of Koh et al. (October 31, 2002) is after the priority date of September 6, 2002, it is respectfully submitted that Koh et al. is not prior art to this subject matter, and the rejection based upon Koh et al. should be removed. Moreover, as set forth in further detail below, it is respectfully submitted that Koh et al., Inazawa et al., and Nallan et al. all fail to disclose or render obvious the combined features of the present invention or the advantages achieved thereby. Therefore, this application is now in condition for allowance.

The Office Action indicates claims 7-10 are anticipated by Inazawa et al., and that all claims are rendered obvious by Koh et al. and Nallan et al. Further, the Office Action takes the position that the claimed invention merely relates to the determination of an optimum or workable range. It is respectfully submitted that the characterization of the present invention is incorrect, as is the analysis and reliance upon *In re Aller*. None of the references recognize the significance of controlling residence time, and therefore, the present invention would not result from routine experimentation or optimization. In order to characterize an invention as an obvious matter of optimization of a parameter, the art must recognize the parameter as a

result-effective variable to be optimized, to provide evidence that arriving at a particular claimed range would result from mere routine experimentation. See, e.g., *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). This is not the case with the respect to the present invention and the cited references, as the references relied upon do not recognize residence time as a parameter or variable to be optimized or a result-effective variable. Moreover, the present claims do not merely specify an optimum range of a known result-effective variable, but rather, provide a relationship of residence time depending upon other variables, with only Applicants recognizing the significance of controlling residence time in the context of the relationship of the residence time with the other conditions or variables. There is no disclosure or suggestion as to the importance of residence time in the cited references, nor is there is a recognition as to how to determine the residence time with respect to the other parameters in combination including: the inner pressure, the effective volume of etching space, and the flow rate. Accordingly, it is respectfully submitted that the present invention is clearly not disclosed or rendered obvious by any of the references relied upon, including Inazawa et al, Koh et al., and Nallan et al.

In accordance with the features of claims 1 and 7, a method and apparatus for dry-etching a Si substrate or a Si layer is provided. The method and apparatus can be particularly advantageous in forming a trench having a substantially vertical sidewall by balancing the deposition rate and the etching rate near the bottom of the etched trench. There are many etch conditions or parameters that can be varied, and none of the cited references discloses or suggests the residence time parameter of the present invention, which only the present application recognizes as advantageous to control. In addition, the cited references fail to disclose or suggest the advantageous results which can be achieved with a controlled residence time in order to achieve the desired substantially vertical sidewall by balancing of the deposition rate and the etching rate. The cited references do not disclose or suggest

which process parameter or parameters to vary to achieve the desired results, and therefore, it is submitted that the present invention would not result from mere routine experimentation utilizing the teachings of the references relied upon. Accordingly, it is respectfully submitted that the assertion of the Office Action that the present invention is a mere optimization that would result from mere routine experimentation is without support.

The references relied upon in the Office Action, including Inazawa et al, Koh et al, and Nallan et al. fail to disclose or suggest controlling of or the relationship of the parameters set forth in the present claims, particularly the residence time τ, or the advantages achieved thereby in balancing the deposition rate and etching rate near the bottom of the trench so as to achieve a substantially vertical sidewall. Clearly, there is no recognition of residence time as a result-effective variable in the cited references, nor is there a disclosure or suggestion as to the relationship of the residence time with other conditions as in the present invention. Still further, there is no disclosure or suggestion that varying or controlling of the residence time will provide the advantageous results achieved by the present invention. Accordingly, it is submitted that the rejections of the Office Action should be withdrawn, as the cited references clearly fail to anticipate or render obvious the combined features of the present claims.

Because the present invention is not a mere optimization of a recognized result-effective variable, it is submitted that the rejections of the Office Action are overcome and should be withdrawn. The cited references fail to disclose or suggest the significance of controlling residence time, and moreover, the cited references clearly fail to disclose or suggest the relationship of residence time with other parameters so that a desired residence time (and the advantages associated therewith) can be achieved.

As to the rejection of claims 7-10 as anticipated by Inazawa et al., claim 7 includes the feature in which means are provided for controlling the etching gas supply unit and the

discharge unit to regulate a flow rate of the etching gas and the inner pressure of the processing chamber to maintain a residence time at a level equal to or greater than 180 msec while etching the Si substrate or Si layer to thereby form a substantially vertical etch. The features of claim 7 are clearly not disclosed or suggested by Inazawa et al. Inazawa et al. discloses a plasma etching apparatus with upper and lower electrodes, with RF power supplied across the upper and lower electrodes. Further, the Inazawa et al. apparatus is described as capable of increasing the etching selection ratio of the etching target layer and the underlayer. There is no disclosure or suggestion as to the combined features of claim 7, particularly the features relating to the residence time and the relationship of the residence time with the other parameters as claimed.

Regarding the rejection of claims 1-10 as obvious in view Koh et al., as noted earlier, submitted herewith is a translation of the priority document for the present application to remove Koh et al. as prior art as to this subject matter. Moreover, as also discussed above, it is submitted that Koh et al. fail to disclose or render obvious the combined features of the present claims. Accordingly, the present claims are also patentable over the Koh et al. reference.

As to the rejection based on Nallan et al., here again, Nallan et al. fail to disclose or render obvious the combined features of the present claims. As discussed earlier, Nallan et al. fail to disclose or suggest the significance of controlling the residence time as in the present invention, nor does Nallan et al. disclose or suggest the relationship of the residence time with other parameters as set forth in the present claims.

In view of the foregoing, it is submitted that claims 1 and 7 are clearly in condition for allowance. Dependent claims 2-6 and 8-10 are therefore allowable for at least the same reasons. In addition, it is submitted that claims 2-6 and 8-10 recite additional features which

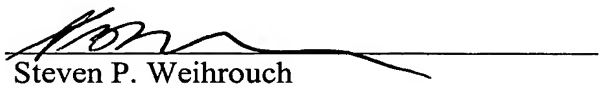
are not suggested by the cited references, particularly in combination with the features of the claims from which they depend.

For the foregoing reasons, it is respectfully submitted that this application is now in condition for allowance. A Notice of Allowance for claims 1-10 is earnestly solicited.

Should the Examiner deem that any further action is necessary to place this application in even better form for allowance, he is encouraged to contact Applicant's undersigned representative at the below listed telephone number.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



Steven P. Weihrouch
Attorney of Record
Registration No. 32,829

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 06/04)

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